ELECTROLYTIC ZINC WORKS

Nomination for a

Heritage Recognition Award

EZ Works

Prepared by Nick Ramshaw

for

Nyrstar & Engineering Heritage Tasmania

June 2012

CONTENTS

INTRODUCTION

Zinc is the fourth most widely used metal after iron, aluminium and copper with an annual production of about 11 million tonnes. The major uses of zinc are in galvanising (55%), die-casting alloys (17%), brass and bronze alloys (12%), rolled zinc products (6%) and zinc compounds (10%).

All zinc was originally produced using thermal methods and it wasn't until early in the twentieth century that the Roast-Leach-Electrowin (RLE) process was developed. The first successful plants were built at Trail, in British Columbia, Canada and at Butte, Montana, USA, both in 1915. The knowledge gained at the American plant was used in establishing the Zinc Works at Hobart. Today, the RLE process produces 90% of the world's zinc.

The steps in the RLE process are:

- Roasting – The zinc sulphide concentrates are roasted (burnt in air) at a temperature of greater than 900°C to produce an impure zinc oxide, known as calcine, and sulphur dioxide gas, which is converted to sulphuric acid – an important by-product. The concentrates contain iron as a major impurity and this is converted to zinc ferrite during roasting. Roasting is required to get the zinc into a form that is soluble in dilute sulphuric acid.
- Leaching – The calcine is reacted with sulphuric acid, contained in spent electrolyte from the Electrolysis step. The zinc oxide dissolves easily, but hotter, more acidic conditions are needed to dissolve zinc ferrite. The iron from the dissolution of zinc ferrite is subsequently precipitated, for example as a goethite. The iron precipitate and the undissolved lead and silver are separated using filters.
- Purification – The resulting solution contains minor levels of impurities, such as cadmium, cobalt and copper, and these are removed in the Purification section by the addition of zinc dust. The resulting solution contains very pure zinc sulphate.
- Electrolysis – Zinc metal is recovered from the purified solution in electrolytic cells by the passage of an electric current. The zinc metal is deposited onto aluminium cathodes and oxygen is generated at the lead anodes. The zinc deposits are periodically removed, or stripped, from the cathodes. The stripped zinc is melted and cast into the various products such as special high-grade zinc (99.995% zinc) and die-casting alloys. When zinc is produced at the cathode sulphuric acid is generated and the zinc depleted solution, called spent electrolyte, is returned to Leaching to dissolve the zinc from calcine.

The Zinc Works was established at Risdon, Tasmania, in 1916. Located on the Derwent River 5km from the centre of Hobart, Risdon was selected as the site for the Zinc Works because of:

- Availability of cheap electrical power.
- Availability of land, some of which was leased to the company by the Tasmanian Government, the rest purchased.
- Access to deep water to establish a port.
- A pool of workers to build and operate the plant.

The plant has undergone a number of modifications which has increased the output from 50,000 tonnes in 1926 to 280,000 tonnes in 2011. The works remain one of the largest and most efficient zinc refineries.

HERITAGE AWARD NOMINATION FORM

The Administrator
Engineering Heritage Australia
Engineers Australia
Engineering House
11 National Circuit
BARTON ACT 2600

Name of work: ELECTROLYTIC ZINC WORKS

The above-mentioned work is nominated for an

Engineering Heritage Award

Location, including address and map grid reference:

Risdon Road, Lutana, Tasmania

AMG E526 N 5 2575

Owner (name & address):

Nyrstar

Registered in Belgium, Head Office in Zurich, Switzerland.

The owner has been advised of this nomination and an email of agreement is attached.

Access to site: From the Brooker Highway, Risdon Road leads directly to the Works.

Tours of the Works can be arranged.

Nominating Body: Nyrstar Hobart

Jeremy Kouw
General Manager of Nyrstar Hobart

Date: 26/06/2012

Bruce Cole
Chair of Engineering Heritage Tasmania

Date: 26/06/2012

OWNER'S LETTER OF APPROVAL

From "Linton, Jennifer" <jennifer.linton@nyrstar.com> 20/02/2012 12:38 PM

Dear Mr. Cole

On behalf of Jeremy Kouw, General Manager Nyrstar Hobart, firstly our apologies for not contacting you sooner with regard to your correspondence of 12 January 2012!

Please be advised that we are very honoured indeed to accept your invitation to be nominated for an Engineering Heritage Award.

As a result may I advise that our Communications Project Co-ordinator, Sharni Driessen, will be your key contact person with regard to the nomination preparations. Sharni's email address being: sharni.driessen@nyrstar.com

Once again our thanks indeed for your nomination.

Kindest regards

JENNIFER LINTON
Personal Assistant to the General Manager
jennifer.linton@nyrstar.com
Ph: +61 3 6278 4602
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NYRSTAR HOBART
GPO Box 377
HOBART TAS. 7001.
www.nyrstar.com

HISTORICAL SUMMARY

In 1908 James H. Gillies visited Hobart looking to set up both a zinc plant and a hydro-electric plant – the latter to generate the power required for the electrolytic process. Gillies was a visionary who had worked on a flotation process at Broken Hill to separate zinc and lead ore, realised that zinc concentrate would become abundant, and started to investigate zinc production (Tuck, 1966).

In 1909, Gillies acquired land south of Hobart with the idea of building an electrolytic zinc plant as well as other high energy uses, such as calcium carbide production. Experiments on zinc electrolysis were carried out in a laboratory in Salamanca Place but the experiments were not entirely successful and only a small quantity of spongy zinc was produced (Alexander, 1992).

The Tasmanian Government had granted Gillies' company, the Hydro-Electric Power and Metallurgical Company, rights to construct a dam and power station using water from the Great Lake, in the middle of the state. The dam and power station were built, but a lack of money stopped the project, which was then taken over by the Tasmanian Government in 1914 (Mercury). Gillies continued working on his vision of establishing a zinc and carbide plant at Electrona, but only the carbide plant was built.

Until 1914 zinc production was largely carried out in Belgium (20% of the world's production), Germany (26%), and the USA (32%). Britain sourced most of its supplies from Belgium and Germany, but with the outbreak of the First World War there was a shortage of zinc metal, required to make munitions, in the British Empire. After the outbreak of war, when Germany overran Belgium, the zinc price increased 3½ times (Mercury article, 1915). To exacerbate matters the Australian concentrates from Broken Hill had been processed in Europe, so the war created an immediate interest in producing zinc in Australia.

Amalgamated Zinc (de Bavay's) Limited, who owned thousands of tonnes of high-zinc concentrate at Broken Hill, started investigating electrolytic zinc production. Herbert Gepp, the general manager of the company, who was in America at that time trying to find markets for concentrate, was instructed to investigate the process. His reports were favourable so the company looked to set up a site in Tasmania, because of the cheap power to be shortly available, and signed a contract with the Government for the supply of power.

Part of the contract signed between Amalgamated Zinc and the Tasmanian Government was published in the Mercury newspaper and makes fascinating reading. The article gives the cost of various blocks of power the company was planning to take, and mentions other products, such as calcium carbide, calcium cyanide, and caustic soda, that the company were contemplating manufacturing at Risdon. The cost of the first block of power of 2,983kW (4,000 horsepower) was £3 10s per hp per year and for the second block of power of a further 19,388kW (26,000 horsepower) was £2 per hp per year. Correcting for inflation to 2010 (RBA web site), the power prices were 3½ cents per kWh for the first block of power, and 2 cents per kWh for the second block of power.

The venture in Tasmania was spun off as a separate company in 1916. The new company was incorporated in Victoria on Friday 2nd June 1916 as the Electrolytic Zinc Company of Australasia Propriety Limited (EZ). No time was wasted as the first board meeting was held on Saturday, 3rd of June at Collins House in Melbourne. Those present were: W. L. Baillieu (elected Chairman at the meeting), Montague Cohen, J. L. Wharton, A. de Bavay, and E. Shackell (Secretary).

On 16th November 1916 work started on the Risdon site while experiments using the new technology were carried out on the mainland. Later in the year Mr. Gepp arrived back from America with a core staff of metallurgists and engineers. Of these original technical staff only one, W. Conrad Snow, remained for any length of time, eventually retiring in 1952 as the General Superintendent of the Risdon Works.

In early 1917 Mr. Gepp was appointed as the first general manager of the Electrolytic Zinc Company on a salary of £1,500 plus quarters, fuel and light (EZ Board Minutes, 1917). Two months later, he

was given a further £600 in lieu of quarters, fuel and light. His total salary of £2,100 equates, in 2010 dollars, to $172,000.

The first production at Risdon, on 9th February 1917, was in experimental glass cells that produced a few kilograms per day. The first industrial small-scale plant, designed to produce 113 kg (250 lb) of zinc a day, started operating on 10th March 1917.

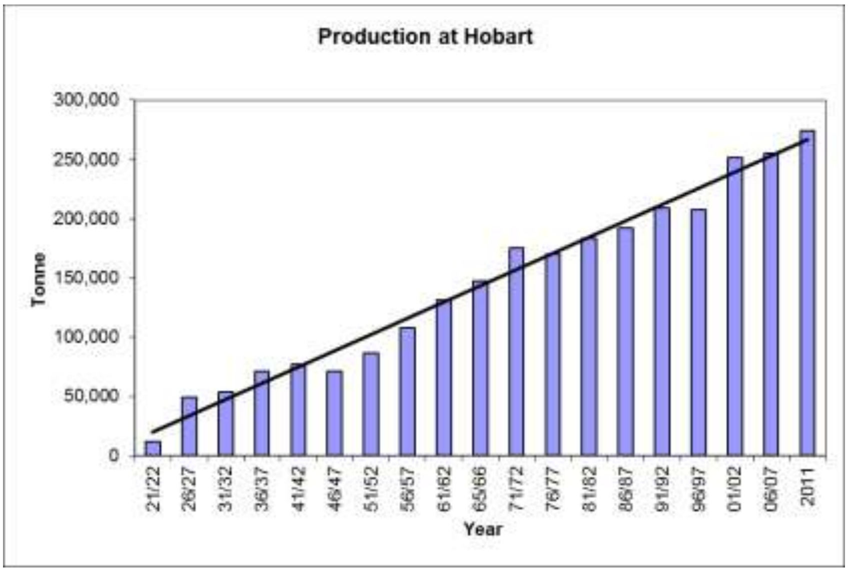
Alongside the construction of the small-scale plant, construction was proceeding in parallel on a much bigger unit, known as the 10-Ton plant. Equipment at this time was in short supply because of the war, and there were always concerns that the required equipment would not be available. Some of these fears were borne out when the "Port Adelaide" was torpedoed on 3rd February 1917, taking some electric motors destined for Risdon to the bottom of the English Channel. As it turned out, the loss of the equipment had little effect and the 10-Ton plant was started up on 7th January 1918.

At the time the 10-Ton plant was operating, the company branched out and constructed plants to make lithopone, zinc oxide, and rolled zinc. Lithopone is a mixture of barium sulphate and zinc sulphide, used mainly as a paint pigment, as was zinc oxide (barium sulphate was mined at Beulah, in northern Tasmania). None of these plants were successful and only operated for a few years.

The 10-Ton plant, which was built to prove the technology, ran successfully until the end of December 1920, when it was shut down because of a low zinc price. By then, the Board had authorised the construction of a much bigger plant, the 100-Ton plant. After the plant shut down no zinc was made on site until the first unit of the 100-Ton plant came into production in November 1921. The 10-Ton plant was restarted in 1923 and was run almost continuously until it was permanently shut down in 1963.

To finance the expansion to the 100-Ton plant, the Company was made public in October 1920 and the authorised capital was increased to £3,000,000 from £750,000. The share holdings consisted of 1,500,000 preference shares and the same number of ordinary shares. The preference shares were issued during a financial low point following the war, and William Baillieu put the family fortune on the line and underwrote the shares.

From the start-up of the 100-Ton plant, improvements have continued to be made and, as a result, zinc production has steadily increased up to the tonnage produced today.



Zinc Production at Hobart Since the Start of the 100-Ton Plant

In 1923 it was decided to enter the fertilizer market and make superphosphate, so roasting furnaces were constructed to produce the sulphur dioxide required for manufacturing sulphuric acid. The superphosphate plant started up in 1924.

Diversification into the fertilizer business continued, when making ammonium sulphate was seen as another use for sulphuric acid that was produced on site. Construction of the Ammonium Sulphate

plant started in 1950, although, because of a shortage of power from the Hydro-Electric Commission, start-up of the plant was delayed until late in 1956. The plant was designed to produce 60,963 tonne (60,000 tons) a year of ammonium sulphate. The plant ran until 1986, although the ammonia section of the plant continued to run until 1993, to supply ammonia for the Leaching plant to make jarosite.

Ammonia was synthesised by reacting nitrogen and hydrogen at a pressure of 29,000 kilopascals (290 atmospheres) using a catalyst to promote the reaction. The nitrogen was obtained by distilling liquid air and the hydrogen was made by electrolysing water, which used a considerable amount of power. The rectifiers used for the electrolysis of water were mercury arc rectifiers, installed in 1956.

BASIC DATA

Item Name: Nyrstar Hobart

Other/Former Names: Electrolytic Zinc Company of Australasia
North Broken Hill Peko
Pasminco Hobart
Zinifex Hobart
Usually referred to by locals as 'The Zinc Works'

Location (grid reference if possible):
AMG E526 N 5 2575

Address: Risdon Road, Lutana, Tasmania
Suburb/Nearest Town: Hobart
State: Tasmania
Local Govt. Area: Glenorchy City Council
Owner: Nyrstar
Current Use: Manufacture of zinc and sulphuric acid.
Former Use (if any): None
Designer: The 100-Ton plant was designed in-house, largely based on the Montana plant.
Maker/Builder: Company employees.
Year Started: 1916 **Year Completed**: 1923
Physical Description:

- Main original process components
  - Wharf for calcine and concentrate supply and zinc dispatch
  - Haulage system for transporting materials around the site
  - Final roasting plant
  - 100 ton leaching plant producing zinc sulphate solution
  - Purification plant removing copper, cadmium, and cobalt
  - Electrolytic cell units 1 2 and 3 producing zinc
  - Casting plant producing ingots
- Support services components
  - Hydro-electric substation supplying 36 MW (about 25 MW used on site).
  - Rotary converters and motor generators for DC supply for electrolysis
  - Compressed air station
  - Water supply
  - Rail transport for workers

Physical Condition:
The original cell unit structures (1 to 3) are still in use, although all the operational components, such as the cells, busbars, and rectifying equipment, have been replaced. The cadmium cell room, which dates from 1923, is also still in use. The original equipment in roasting, leaching, and casting has all been scrapped.

MODIFICATIONS & DATES

Concentrate supply

1917-2007 Broken Hill

1924-	Rosebery
1971-87	Mt Isa
1983-2006	Elura
1989-2001	Hellyer
2001-	Century

Roasting

1922	Leggo furnaces (4)
1923	Pre-roasting Herreshoff furnaces (6)
1923	Sulphuric acid plant
1943,44	Skinner Hearth roasters (2)
1948,57	Flash roasters (4)
1948-67	Contact acid plants (4)
1969,75	Fluid bed roasters (2)
1981	No 6 acid plant
1993	No 5 acid plant

Leaching

1941-71	Residue stockpiled on site
1945	Changed from a batch to a continuous leach
1971	Residue treatment producing jarosite (ocean disposal)
1991	New leaching plant
1997	Conversion to paragoethite (ocean disposal ceased)

Purification

1923	Cadmium plant
1927	Precipitation of cobalt using nitroso-beta-naphthol
1936	Cobalt oxide plant (shut down 1989)
1989	New purification plant using zinc dust for cobalt removal

Electrolysis

1935	No 4 unit added
1960	First cells of No 5 unit used; first solid state rectifiers
1968	First silicon rectifiers
1971	No 6 unit added
1980	Automatic stripping machine
1998	Second automatic stripping machine, hand stripping ceases

Casting

1938	Oil firing replaced by coal firing
1960	Electric induction furnace
1970	New casting plant

Fertiliser

1924	Superphosphate plant (sold in 1998)
1956	Ammonium sulphate plant (shut down 1986)
1964	Aluminium sulphate plant (shut down 1990)

Historical Notes: See Introduction

Heritage Listings Derwent Park is a Colonial Georgian Building listed on the Tasmanian Heritage Register ID 1641.

Derwent Park & Barns are listed on the Register of the National Estate ID 10933.

HERITAGE ASSESSMENT

Historic Phase:

James Gillies attempt to develop both hydro-electric power and the electrolytic production of zinc in Tasmania led to the construction of the first Government owned hydro-electric power scheme (Waddamana) in 1914 and the Hydro-Electric Department to becoming a long term supplier of electricity to the zinc works.

At Broken Hill, Amalgamated Zinc (de Bavay's) Ltd owned thousands of tonnes of high-zinc concentrate which was normally processed in Europe. The advent of World War I created an immediate interest in producing zinc in Australia. Setting up a zinc plant in Australia was strongly encouraged by the Prime Minister (Billy Hughes).

Historic Individuals or Association:

James H Gillies was a metallurgist who developed a flotation process at Broken Hill, and had patented a process for producing zinc by electrolysis. In 1908 he set up the Complex Ores Company to exploit his patent. After negotiating with the Tasmanian Government to obtain water rights the Complex Ores Co spun off a separate company in 1910, the Hydro-Electric Power and Metallurgical Company, to build a power station, an electrolytic zinc plant, and a calcium carbide plant.

As mentioned previously, the Government took over the hydro-electric scheme in 1914 but Gillies continued to pursue his dream of building an electrolytic zinc plant. However, the plant did not eventuate, although a calcium carbide plant was constructed at Electrona, south of Hobart, which was to be the site of his zinc plant. Gillies was granted a pension by the Tasmanian Government in 1935 in recognition of his services towards Tasmanian industrial development.

William L Baillieu (1859-1936) was a financier and politician who started work at the Bank of Victoria before moving into real estate and making his fortune. He first became involved with mining in 1890 with a black coal scheme.

In 1901 he was elected to the Victorian Legislative Council becoming a Government minister in 1909. Earlier, in 1904, he had been introduced to Auguste de Bavay, who was working on flotation at Broken Hill.

In 1909, along with his brother Edward, Montague Cohen, and de Bavay founded Amalgamated Zinc (de Bavay's), the forerunner of the Electrolytic Zinc Company. In 1910 he built a home for his various companies in Collins Street, Melbourne, which became known as the Collins house group. Baillieu was an optimistic man, and during the early technical difficulties in Hobart remained upbeat about the new process. In 1920 the EZ Co was floated, at that time the largest float in Australia, and Baillieu put the family fortune on the line to guarantee the float.

The late Sir Herbert Gepp.

Sir Herbert Gepp (1877-1954) was first employed as a junior chemist at the Australian Explosives and Chemical Company in 1893. He joined the Zinc Corporation at Broken Hill in 1905 and worked on the problem of separating zinc from the tailings dumps. In 1907 he was employed as the manager of de Bavay's Treatment Company and worked on flotation of the ores. When, in 1909 a new company, Amalgamated Zinc (de Bavay's), was

formed to exploit the newly developed flotation technique, Gepp transferred to the new company.

At the start of the First World War Gepp joined the AIF, but was released from army duty following the intervention of Billy Hughes (Prime Minister) and William Baillieu. Gepp was sent to North America to sell zinc concentrates and while in America investigated the newly developed electrolytic zinc process, in particular at the Anaconda Copper Company in Montana.

In 1917 Gepp was appointed as the General Manager of the Electrolytic Zinc Company of Australasia, a position he held until being recruited in 1926 by the Prime Minister (Stanley Bruce) to be the head of the Development and Migration Commission. Gepp saw the company through the difficult early days of the small demonstration plants, and the construction and start-up of the 100-Ton plant.

Gepp was a man with strong social values and was held in high esteem. He was on the board of the organisation that was the pre-cursor to the CSIRO, was an inaugural member of Hobart Rotary club (he was the second president), and was the president of the Australasian Institute of Mining and Metallurgy in 1924. Gepp was knighted in 1933.

Willard Conrad (Con) Snow (1884-1970) was an American who trained as a metallurgist at the Agricultural College, Utah. He was employed at the Utah Copper Company as chief chemist before being recruited by Herbert Gepp in 1916.

Snow was one of seven founding specialists of the Hobart plant recruited in the United States. The other Americans left after a few years, leaving Snow as the sole survivor. Snow rose through the organization, becoming Plant Superintendent in 1927 and General Superintendent at Risdon in 1942. He retired from this position in 1952.

Sir Ian Wark (1899-1985) was an industrial chemist who graduated from the University of Melbourne. He briefly worked for the company in Melbourne in 1921 before obtaining a scholarship to further his education. He returned to work for the company in 1926 in Melbourne and, until 1929, worked mainly on zinc electrolysis. He discovered a fundamental relationship between the relative amounts of zinc and acid in an electrolytic cell and the efficiency of the cell. This was kept secret until 1964 when it was published and named Wark's Rule. After he left the company Wark went on to head up the CSIR/CSIRO division of Industrial Chemistry. Wark has CSIRO laboratories, a theatre, and a research institution named after him.

Creative or Technical Achievement:

The site has a long history of technical achievement, having set up a research department in Hobart that ran from the start of the plant up until 1989, when its function was transferred to Newcastle. In 1918 another research site was established in Melbourne in conjunction with the Broken Hill Associated Smelters Pty. Ltd. Many patents were issued to the company, a few of which are mentioned below.

The plant at Risdon is an early example of an electrolytic zinc plant, and the technology was developed as the plant was built and commissioned. The original source of concentrates was from Broken Hill, which is relatively high in manganese, silica, and cobalt. Each of these elements caused problems, which had to be overcome before the plant was a success. The

element that caused particular problems was cobalt, because high levels interfered with the deposition of zinc in the cell room.

The company patented a process in 1918 for cobalt removal that used arsenic to activate cobalt removal with zinc dust. This process was used in Hobart until 1927 when it was replaced using an organic compound, a process also patented by the company. The arsenic process was very effective, and is still used at a number of zinc plants around the world, but has the disadvantage of producing a toxic gas in the presence of acid. It was because of this toxicity that its use was discontinued at Hobart.

As previously discussed, a zinc/iron compound is formed in the roasting step, which when dissolved, necessitates an iron purification step. In the 1960s a process to remove iron was co-patented with two other companies, which involved removing the iron as jarosite. Jarosite is still used as the iron removal stage in a number of plants. The jarosite process was run at Hobart from 1971 until 1997, when it was replaced with the paragoethite process, which was also patented by the company.

Research Potential:

There are several books and papers on EZ, but not a comprehensive history of the technical process. There is some scope for further research on this subject.

Social:

Herbert Gepp was a man with a strong social conscience who advocated cooperation between employees and employers, and, to aid this, he set up an Insurance Society and Co-operative Store. He also established a housing scheme in 1919 using land, purchased by the company, next to the site. Sixty homes were built on this site and rented out to employees.

EZ has been an invaluable employer, and has contributed much to the local economy by wages alone. In 1918 the workforce was 320, which expanded to reach a maximum in the late sixties of around 2800. Since then, as the process has been made more efficient, the workforce has contracted to fewer than 500.

Rarity:

The Hobart plant was the first electrolytic zinc plant in the Southern Hemisphere and an early example worldwide. The only older plant still operating is at Trail, in British Columbia, Canada. The first three cell units are now the oldest still running in the world. The cadmium cell room is the oldest in the world, and the only one still using rotating cathodes. Both the cell units (including the newer units) and the cadmium plant are constructed largely of wood, unlike modern plants.

Representativeness:

The main features of the plant are common to other electrolytic zinc plants, having roasters, a leaching plant, zinc electrolysis, and a casting plant. The details differ, of course, but the main elements are similar in function.

Integrity/Intactness:

Most of the original equipment has been upgraded or replaced. The only early parts of the plant still in production use are the first three units of the cell room, and the cadmium cell room. There are some other original buildings used as store rooms.

STATEMENT OF SIGNIFICANCE

The Electrolytic Zinc Company was established in 1916 to produce zinc metal from zinc sulphide ore using cheap electricity to be provided by a hydro-electric scheme run by the Tasmanian Government. Under General Manager Herbert Gepp, zinc production began at Risdon in 1917 in a small-scale plant, followed by a 10 ton per day plant in 1918 and a 100 ton plant in 1921. The Hobart plant was the first electrolytic zinc plant in the Southern Hemisphere and an early example worldwide. Technical innovation has been essential to remove troublesome impurities in differing sulphide ores. Progressive improvements and expansions have increased output to 274,000 tonnes of zinc in 2011. Other products have included sulphuric acid, cadmium, cobalt oxide, zinc sulphate, copper sulphate, aluminium sulphate, and fertiliser. Enlightened management provided housing, insurance and a cooperative store for employees in the early days of the plant.

LEVEL OF SIGNIFICANCE National

INTERPRETATION PLAN

It is proposed to erect the marker and the interpretation panel in a meeting room, known as the Gepp room, where community consultation meetings are held.

Interpretation Panel Title: **ELECTROLYTIC ZINC WORKS**

Proposed themes:

1 The electrolytic process

The process used at Hobart is knows as a Roast-Leach-Elecrowin, and is typical of zinc plants using zinc sulphide concentrates. In the first, roasting, stage the concentrates are burnt in air to produce a crude zinc oxide and sulphur dioxide. The crude zinc oxide, known as calcine, is dissolved in dilute sulphuric acid in the leaching stage. The resulting solution is purified before being sent to the electrolysis stage where an electric current is used to plate out the zinc on aluminium cathodes, and produce dilute sulphuric acid. The acid produced in the electrolysis stage is then used in leaching to dissolve more zinc oxide. The zinc is removed from the cathodes and melted into the various products in the Casting plant.

2 Getting started

The foundations for the zinc works had been set by the construction of the Waddamana power station by the Hydro Electric Power and Metallurgical Company. Hydro power at this time was the cheapest power available, and thus attractive to industries that used considerable amount of power, such as those using electrolysis to produce metals.
The Broken Hill companies sold most of their zinc concentrates to Germany and Belgium, and, as Germany overran Belgium early in the First World War, the market for the concentrates dried up. As well, the Western Allies produced very little zinc themselves, which is necessary for armament manufacture. The shortage of zinc drove up the price by a factor of six, which made it attractive for companies to invest in zinc production.

3 Constructing the Works

A new company, the Electrolytic Zinc Company, was formed in 1916 by a consortium of Broken Hill companies. Construction of a small-scale test unit was started in the same year, followed by a larger unit in 1917-18. After the success of the small scale units a decision was made to construct a larger 100 ton per day plant, the first part of which started operations in 1921. Since the start of the 100 ton per day the plant has been expanded and modified to increase production to the present level.

4 Important people

James Gillies was the entrepreneur behind the construction of the Waddamana power station, which was built specifically to make zinc. He set the foundations for the electricity supply, and can be regarded as the father of Tasmanian industry.
Herbert Gepp was the first general manager of the Electrolytic Zinc Company and saw the company through the turbulent early days when there were many technical problems to overcome. He was very community minded and was instrumental in setting up employee benefits, including the housing scheme.
William Baillieu was a driving force behind setting up the company, and was confident of its success. Following the end of the war, when the company became public, he put his family

fortune on the line to underwrite the share issue, which was during the depression following the end of the war success.

5 Community benefits

From the start of the company the employees were well treated. An insurance scheme was set up, and houses were built at Lutana for the workers. A Co-operative Council was set up that sold cheap supplies such as firewood and meat to the employees.

The wages bill over the years has added an enormous amount of wealth to Tasmania and employed a large number of people, attested to by the number of Tasmanians who know, or have known, someone who worked at the zinc works.

Illustrations

The flow chart or production chart
Sir Herbert Gepp
Electrolytic cells
Zinc ingots
Rehab of dump site & jarosite story

Implementation

The design, manufacture, supporting structure, funding and on-going maintenance have been discussed with the owner, and a good working arrangement is expected.

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Snow, W.C. (1936) “Electrolytic Zinc at Risdon, Tasmania.” *pages 482-526,Trans American Institute of Mining Engineers. Vol.121, New York, U.S.A.*

Other sources used, the first two are not in the public domain.

- Detailed flow sheets of the Company’s operation, December 1923.
- E.Z. Board Minutes.
- The Mercury newspaper 1900-1920 (web site trove.nla.gov.au).
- Various EZ Reviews, published between 1955 and 1975, available from the National Library of Australia.

APPENDICES

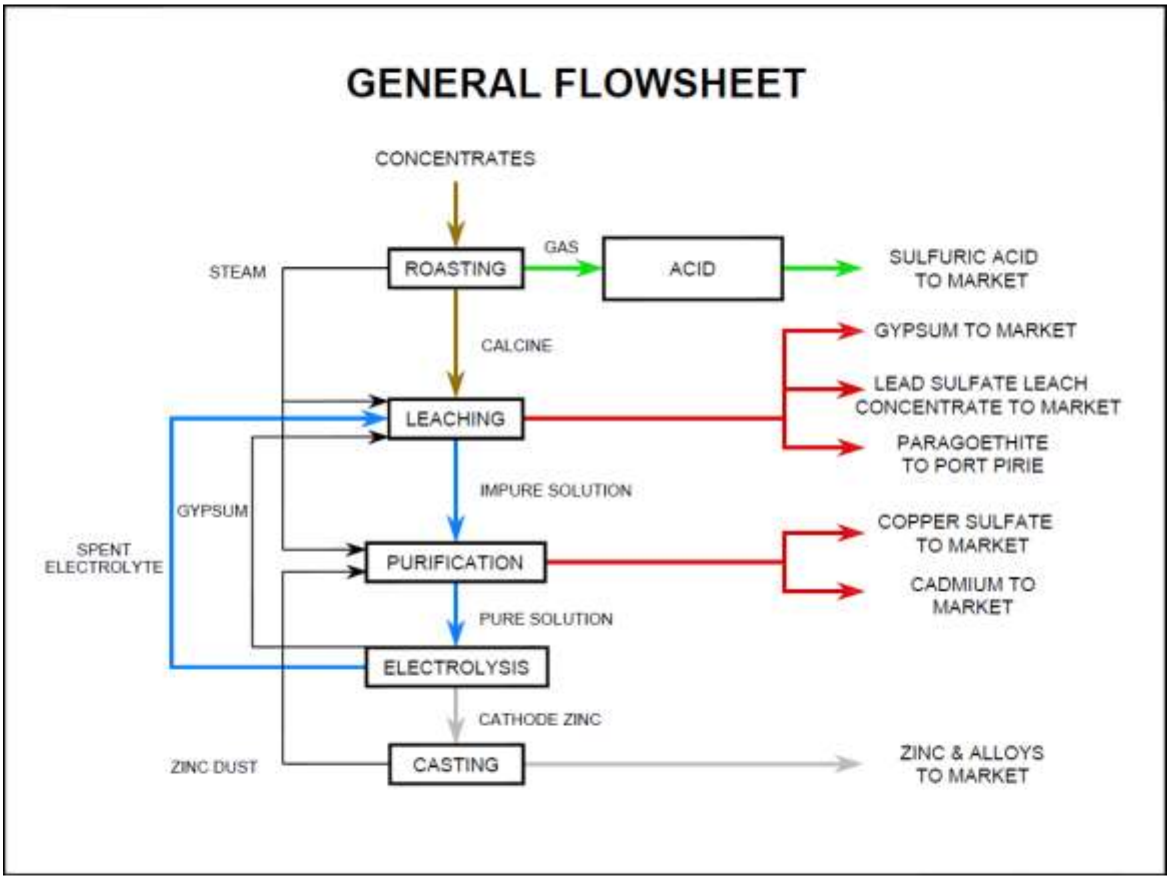
Appendix A – Corporate History

Like most old industrial sites, the ownership of the Hobart plant has changed over the years; the major changes are shown in Table 1.

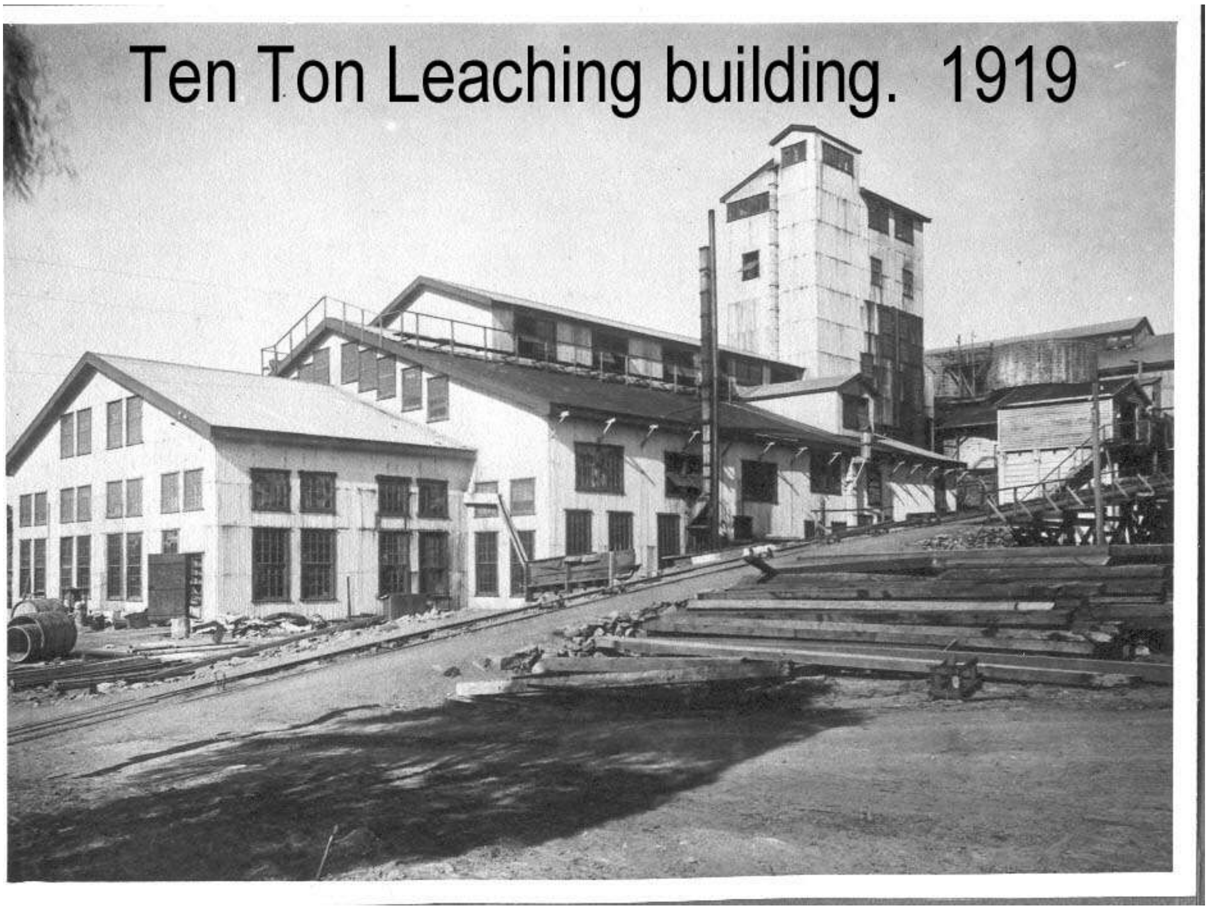
Table 1: Corporate Ownership of the Risdon Plant.

1916	The Electrolytic Zinc Company of Australasia was founded.
1956	EZ Industries Limited was formed as a holding company.
1984	EZ was absorbed into North Broken Hill Peko Limited.
1988	North Broken Hill Peko and CRA combined their zinc interests to form Pasminco. Pasminco ran into financial difficulties in the late 1990s and sold off assets in an attempt to remain solvent. It was at this time that the Superphosphate plant and the Emu Bay Railway were sold.
2004	Zinifex was formed from the ashes of Pasminco, following a period of voluntary administration.
2007	Nyrstar formed from the refineries of Zinifex and Umicore. The company became overseas based for the first time in its history. As the mining assets were split from the refineries the Rosebery mine became part of a separate company for the first time since 1920.

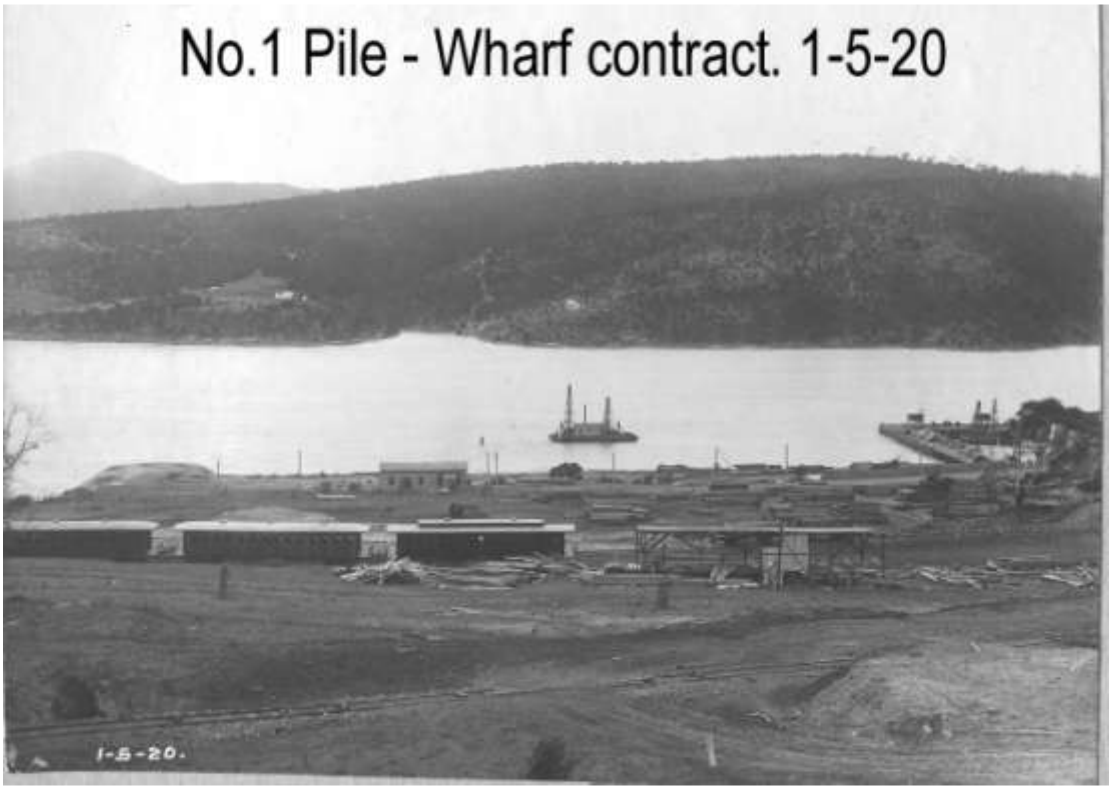
Appendix B - Illustrations



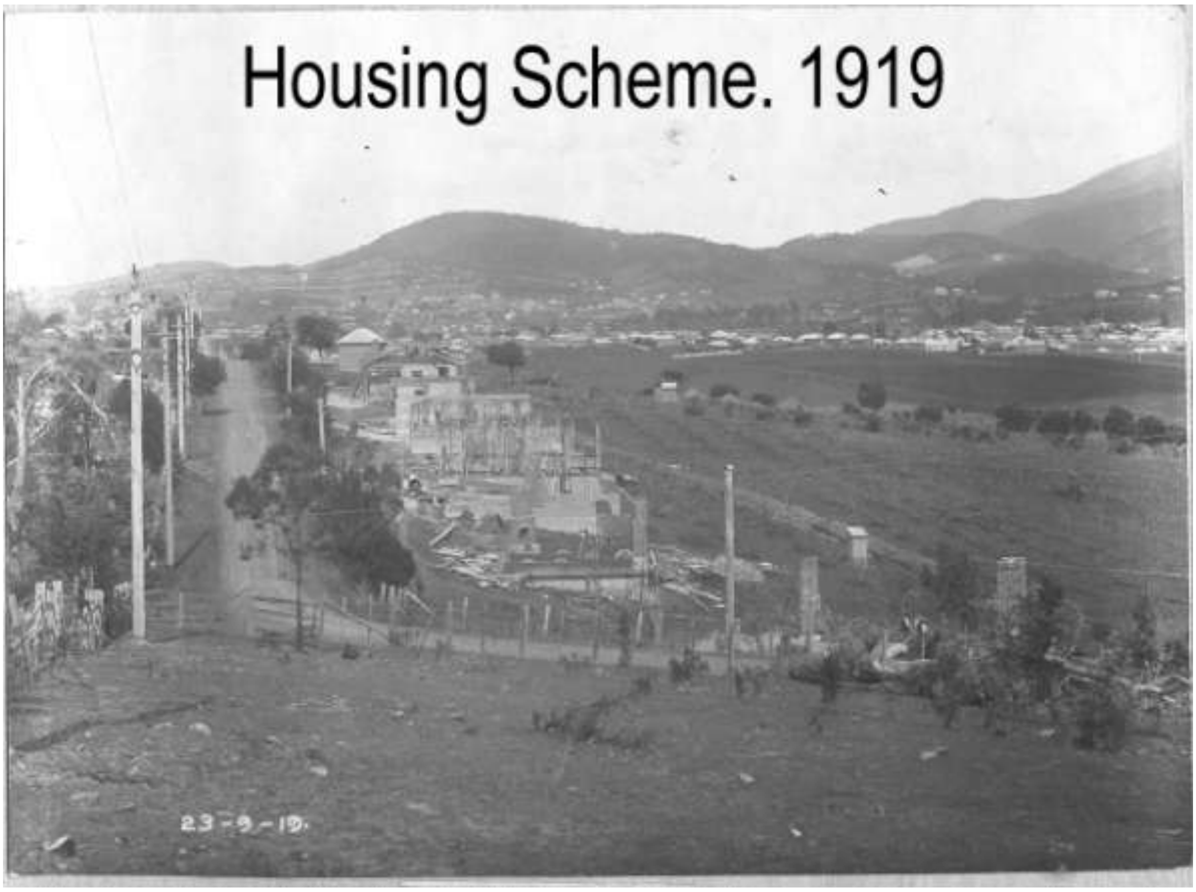
Flow chart of the present process.


Ten Ton Leaching building. 1919

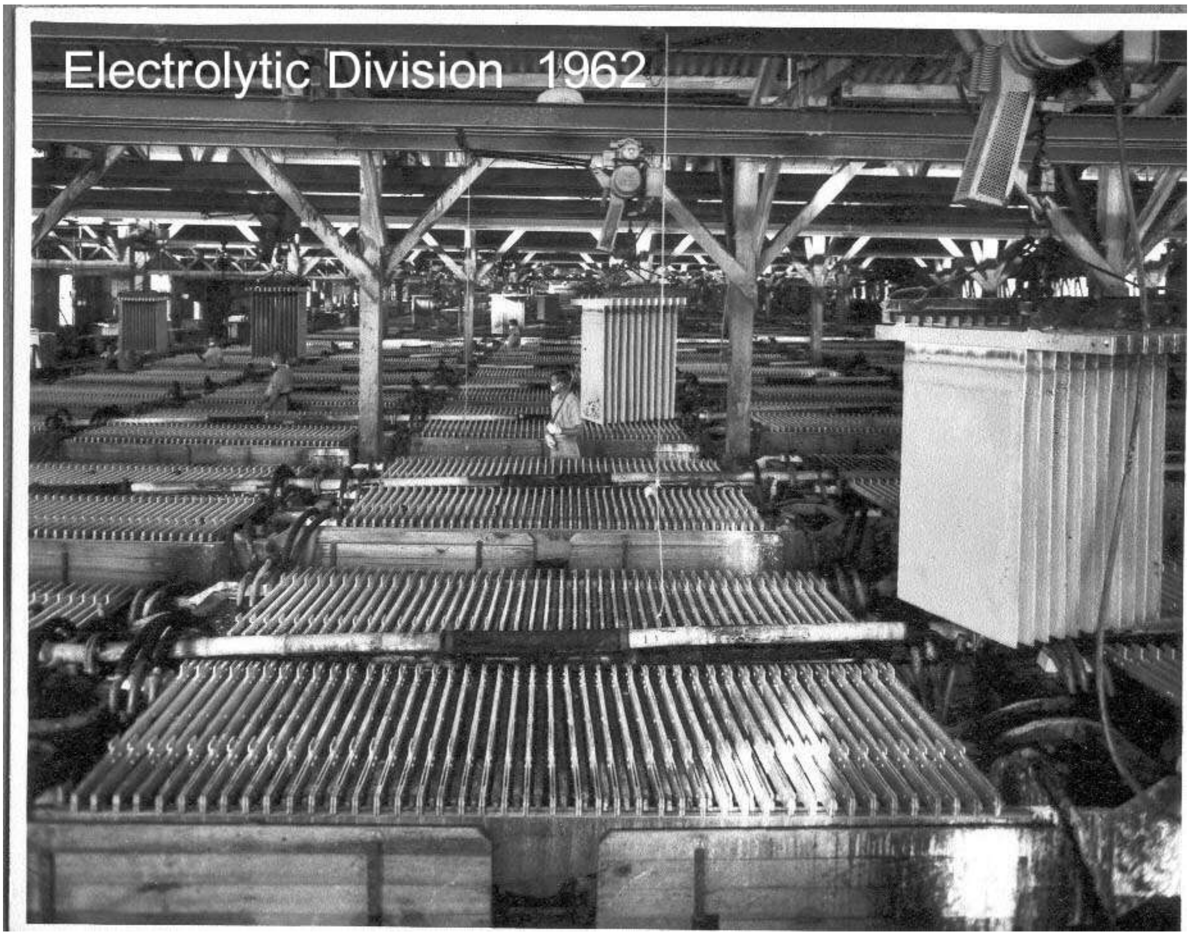
No1 Cell Unit - North corner. 1920



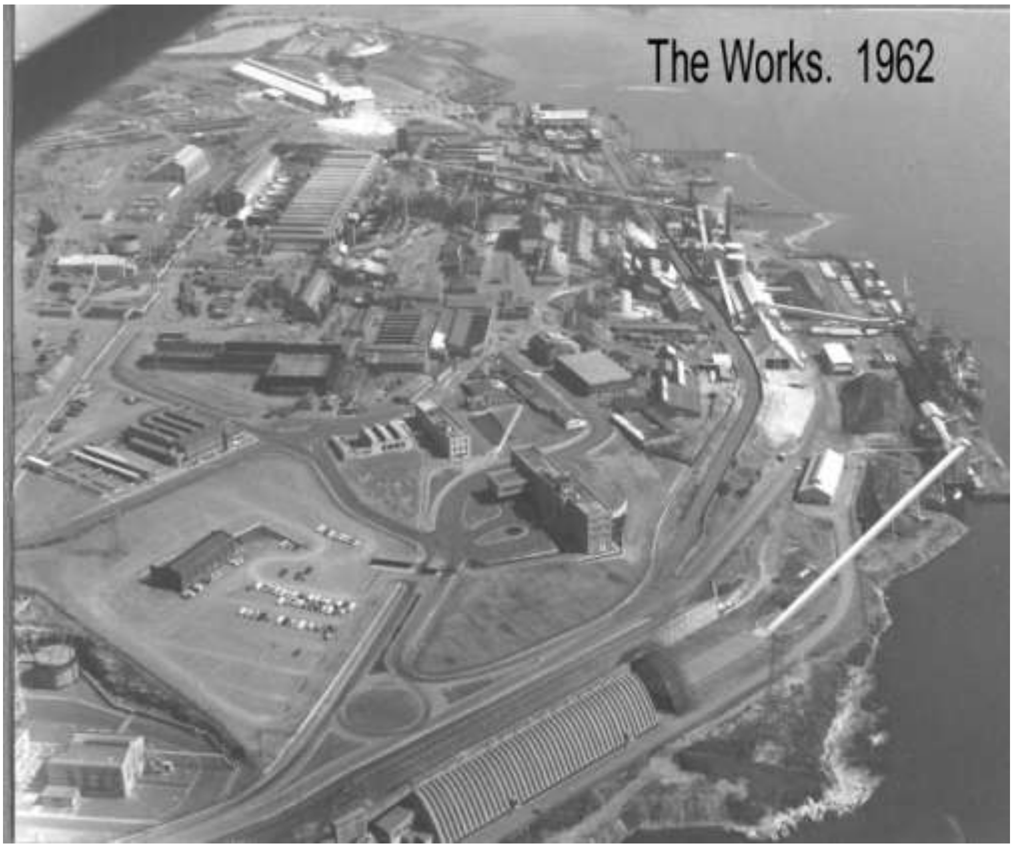
The first pile being driven for the 100 ton plant.



The housing scheme for workers in Lutana.


Electrolytic Division 1962


Casting Division.
1962



The construction of Residue Treatment division in 1969.

Zinc ready to be transported to the customers.

Appendix C – Design, Construction & Procurement

250 lb Plant

Most parts for this plant were fabricated locally, although some parts of the original equipment were prefabricated in America and assembled on site.

10 ton & 100 ton Plants

These were designed and built under the direction of G H Cunningham, the first Chief Engineer, who was one of the American experts recruited by Gepp. The design was based on the Anaconda Copper Company zinc plant in Montana, USA. However all the engineering on site was handled in house from design to construction (up until 1968). Construction of the original plant was delayed for a time by a shortage of draftsmen.

In 1919 the board made the decision to standardise electrical plant from Britain, even though the technical experts recommended the use of American equipment. The Board authorised the acceptance of the tender from Thomson-Houston Co, Rugby, England for the supply of rotary converters, motors, switchgear and auxiliary items of British manufacture. There was also an agreement with the Australian General Electric Company for the supply of electrical equipment.

The Board accepted a tender from Redwood Manufacturers Limited (America) for the supply of tanks for the 100-Ton plant. Local timber was considered, but it was considered impossible to get the required amount of fully seasoned timber suitable for the tanks. Shortly afterwards the price of American wood increased by 58% and the Board decided to use lead-lined tanks of local construction.

Later

In 1968, the No 5 fluid bed roaster was the first element of a major expansion that included the roaster, a new casting plant, residue treatment, No 6 cell and wharf expansion. This was the first time that consultants and contractors were used for project work.